CLAIMS

[1] A plasma processor, comprising:

a processing vessel having a holder holding a substrate to be processed;

a microwave antenna provided on the processing vessel so as to oppose the substrate to be processed; and

a processing gas supply part provided between the substrate to be processed on the holder and the microwave antenna so as to oppose the substrate to be processed,

characterized in that the process gas supply part has a plurality of first openings through which plasma formed in the processing vessel passes, a process gas channel connectable to a process gas source, a plurality of second openings communicating with the process gas channel, and a cooling medium channel through which a cooling medium cooling the process gas supply part flows, wherein the cooling medium includes a cooling gas and mist.

[2] The plasma processor as claimed in claim 1, characterized in that the cooling medium includes SF_6.

[3] A plasma processor, comprising:

a processing vessel having a holder holding a substrate to be processed;

a microwave antenna provided on the processing vessel so as to oppose the substrate to be processed; and

a processing gas supply part provided between the substrate to be processed on the holder and the microwave antenna so as to oppose the substrate to be processed,

characterized in that the process gas supply

part has a plurality of first openings through which plasma formed in the processing vessel passes, a process gas channel connectable to a process gas source, a plurality of second openings communicating with the process gas channel, and a cooling medium channel through which a cooling medium cooling the process gas supply part flows,

wherein a cooling medium circulator circulating the cooling medium is connected to the cooling medium channel.

[4] The plasma processor as claimed in claim 3, characterized in that the cooling medium circulator has cooling means for cooling the cooling medium.

[5] The plasma processor as claimed in claim 3, characterized in that the cooling medium circulator has cooling medium control means for controlling an amount of cooling of the process gas supply part by the cooling medium based on temperature measured by temperature measurement means provided in the process gas supply part.

[6] The plasma processor as claimed in claim 5, characterized in that the cooling medium control means is flow rate control means for controlling flow rate of the cooling medium.

[7] The plasma processor as claimed in claim 5, characterized in that the cooling medium control means is pressure control means for controlling pressure of the cooling medium.

[8] The plasma processor as claimed in claim 7,

characterized in that the pressure of the cooling medium channel is set to 0.2-1 MPa.

[9] The plasma processor as claimed in claim 3, characterized in that the cooling medium includes a cooling gas and mist.

[10] The plasma processor as claimed in claim 3, characterized in that the cooling medium includes SF_6.